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A REVIEW OF EXISTING CONVENTIONS, REGULATIONS, AND POLICIES PERTAINING TO THE CONTROL AND MINIMIZATION OF NEGATIVE IMPACTS FROM AQUACULTURE ON WILD SLAMONID STOCKS

by

Rex Porter
Department of Fisheries and Oceans
P.O. Box 5667
St. John's, NF A1C 5X1

Tim Carey
Department of Fisheries and Oceans
200 Kent St.
Ottawa, Ontario K1A 0E6

Darrell Harris
Department of Fisheries and Oceans
Aquaculture Coordination Office
P.O. Box 129
Dartmouth, NS B2Y 4A2

and

Karen Coombs
Department of Fisheries and Aquaculture
P.O. Box 129
St. George, NB E0G 2Y0

[1] This series documents the scientific basis for the evaluation of fisheries resources in Canada. As such, it addresses the issues of the day in the time frames required and the documents it contains are not intended as definitive statements on the subjects addressed but rather as progress reports on ongoing investigations.

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Abstract

There are many international conventions and agreements, as well as, national and provincial regulations and policies that influence the regulation of salmonid aquaculture activities relative to Atlantic salmon conservation in the Maritime Provinces. These conventions, agreements and regulations generally fall into two categories: those that were developed with the primary intent of conservation and sustainable use of fish and fish habitat including aquaculture; and, those that were developed for trade. Some of the conventions and agreements require a commitment from Canada to implement agreed-on procedures, while others provide guidelines, or good operating practices. International conventions and agreements tend to provide a "level operating field" and consistent standards for conducting business among contracting parties. Although many of the agreements were developed to conserve and protect wild stocks, they also assist the aquaculture industry, particularly in the area of fish health and quality of the environment. This review will consider international agreements, such as, those within NASCO (North American Commission Protocols for the Introduction and Transfer of Salmonids, the Oslo Resolution, and the Precautionary Approach) and ICES, Convention on Biological Diversity, and trade agreements. Federal and provincial agreements, regulations and policies, including among others, the *Fisheries Act* and regulations under the *Act*, Memoranda of Agreements on Aquaculture Development, the Wildlife Policy for Canada, and the policies specific to rainbow trout in New Brunswick, Nova Scotia and Prince Edward Island will also be discussed. Most of the federal regulations described come under the authority of the *Fisheries Act* administered by Department of Fisheries and Oceans (DFO), while the policies have generally been established by DFO and provincial agencies.

Résumé

Nombre de conventions et d'accords internationaux de même que de règlements et de politiques nationales et provinciales interviennent dans la réglementation sur la salmoniculture relativement à la conservation du saumon de l'Atlantique dans les provinces Maritimes. Ces conventions, accords et règlements sont généralement de deux types : ceux qui ont pour objectif principal la conservation et l'exploitation durable du poisson et de son habitat, incluant l'aquaculture, et ceux qui répondent à des objectifs commerciaux. Dans certains cas, les conventions et accords exigent du Canada un engagement pour la mise application des procédures qui résultent d'ententes, tandis que d'autres contribuent des directives ou des cadres de bonnes pratiques. Les conventions et accords internationaux tendent à fournir les conditions équitables et les normes cohérentes nécessaires à la conduite des affaires entre parties contractantes. Quoique bon nombre d'accords visent avant tout à conserver et à protéger les ressources fauniques, ils aident néanmoins l'industrie de l'aquaculture, en particulier dans les domaines de la protection de la santé du poisson et de la qualité de l'environnement. Cet examen portera sur les accords internationaux, tels que ceux qui interviennent dans le cadre de l'OCSAN (protocoles de la Commission nord-américaine sur l'introduction et les transferts de salmonidés, la résolution d'Oslo et la gestion prudente) ainsi que sur le CIEM, la Convention sur la biodiversité et les accords commerciaux. Les accords, règlements et politiques des gouvernements fédéral et provinciaux, notamment la *Loi sur les pêches* et les règlements qui y sont prévus, les protocoles d'ententes sur le développement de l'aquaculture, la politique des espèces sauvages pour le Canada et les politiques spécifiques à la truite arc-en-ciel au Nouveau-Brunswick, en Nouvelle-Écosse et à l'Île-du-Prince-Édouard feront également partie des sujets de discussion. La plupart des règlements fédéraux décrits relèvent de la *Loi sur les pêches* administrée par le ministère des Pêches et des Océans (MPO), alors que les politiques sont en général établies par le MPO et les organismes provinciaux.

Introduction

The federal government, under the *Constitution Act, 1982*, has the authority to manage and regulate Canada's coastal and inland fisheries. There are a number of acts administered by the Department of Fisheries and Ocean (DFO) and other federal government departments which relate to the protection and conservation of fish, their habitat, and the transportation and trade of fish and fish products. It is under these statutes that regulations, national, regional, and international agreements and policies are promulgated. Aquaculture is deemed to be a fishery, and as such is covered by legislation under the *Fisheries Act*. DFO has been named as the lead federal agency in Canada for aquaculture.

The federal government and each of the Maritime Provinces have signed Memoranda of Understanding on Aquaculture Development. These agreements define the roles and responsibilities of each level of government with respect to aquaculture development and conservation and protection of wild fish stocks. The federal government has entered into a number of international agreements for conservation of Canada's natural resources and for the benefit of the Canadian aquaculture industry in the market place.

This paper reviews existing pertinent international agreements, regulations, and policies pertaining to the control and minimization of negative impacts from aquaculture on wild salmonid stocks. The main aspects of each are summarized and the implications on the aquaculture industry are discussed. This paper is not a legal interpretation of the conventions, agreements or legislation.

International Conventions and Agreements

North Atlantic Salmon Conservation Organization (NASCO)

NASCO was established under the Convention of 2 March 1982 for the conservation of salmon in the North Atlantic. The Organization consists of a Council and three regional Commissions: the North American Commission (NAC), the West Greenland Commission (WGC), and the North-East Atlantic Commission (NEAC). The Contracting Parties to the NAC are Canada and the United States of America (USA). **Article 3** of the Convention states that "the objective of NASCO shall be to contribute through consultation and co-operation to the conservation, restoration, enhancement and rational management of salmon stocks subject to the Convention, taking into account the best scientific advice available to it". **Article 7** of the Convention outlines the functions of the NAC. One, of which, is "to provide a forum for consultation and co-operation between the members … in cases where activities undertaken or proposed by one member affect salmon originating in the rivers of the other member because, for example, of biological interactions".

i) North American Commission Protocols for the Introduction and Transfers of Salmonids

The NAC adopted in 1992 and amended in 1994 "Protocols for the Introduction and Transfers of Salmonids" for the Commission Area (Northeastern USA and Canada) (Anon 1992, Anon 1994a). The Protocols are not legally binding, but Canada was party to their adoption and thus, has a commitment to implement them. The NAC first became concerned about the potential for adverse effects on wild Atlantic salmon populations from introductions and transfers in the mid 1980's. Particular concerns at the time were introductions of Pacific salmon into the Northeastern USA, introduction of rainbow trout, importations of salmon from Europe and Iceland and importation of salmonids from areas enzootic to Infectious Hemorrhagic Necrosis (IHN). The NAC Scientific Working Group, at the request of the NAC initially drafted the Protocols using advice from experts in the fields of genetics, fish health and ecology, including ICES Working and Study Groups. The draft Protocols was tabled as a Discussion Document at the NAC Annual Meeting in June 1989. Canada and the USA consulted with stakeholders; and, their comments were considered by each country prior to the NAC adopting the Protocols in 1992 and subsequent amendments in 1994.

Protocols were developed to minimize adverse genetic, fish health, and ecological effects from introductions and transfers on wild Atlantic salmon populations. The Protocols apply to all introductions and transfer of wild and cultured salmonids whether it is for stock enhancement, aquaculture, or commercial sea ranching. The Protocols provide for consistency in application of conditions for introduction and transfers by Zone in the Northwest Atlantic.

The NAC Area has been divided into three Zones for the purposes of the Protocols (Fig. 1). The Protocols for Zone I are the most restrictive and those for Zone III are the least restrictive. The Maritimes and the State of Maine east of Rockland are in Zone II. The Zones were designated based on the degree of habitat degradation or manipulation of the wild Atlantic salmon populations. The Protocols put conditions on, the species, fish health status, reproductive viability, and the origin of brood stock that can be used in enhancement, aquaculture and commercial sea-ranching in each Zone. They establishes fish health measures, and defines ecological considerations.

There are a number of protocols that significantly affect the operations of the aquaculture industry in Zone II. These are:

- Reproductively viable strains of Atlantic salmon of European origin, including Icelandic origin, are not to be released or used in aquaculture in the NAC Area.

- No live salmonid fishes, fertilized eggs, gametes, or fish products are to be imported from IHN enzootic areas, unless sources have an acceptable history of disease testing demonstrating the absence of IHN.

- Develop domesticated salmon broodstock using local stocks; or, if local stocks are limited,

use nearby stocks.

- Reproductively viable non-indigenous species may only be introduced into land-based facilities where the risk of escapement is minimal.

- Non-indigenous salmonid stocks may be introduced into the wild or used in cage rearing operations if the fish are reproductively sterile and the risk of adverse ecological interactions is minimal.

The Protocols are in the process of being revised, and have been circulated for comments as part of the consultation process. However, the main elements of the Protocols with respect to use of distant salmon strains were not changed in the draft revisions. In 1997, the NAC agreed to include protocols on the use of transgenic salmon in the revised Protocols. In essence the Contracting Parties agreed reproductively viable transgenic salmonids would only be used in secure land-based facilities.

ii) Oslo Resolution

The Contracting Parties to NASCO, in 1994, adopted a "Resolution ... to Minimize Impacts from Salmon Aquaculture on the Wild Salmon Stocks" (Anon 1994b). The Resolution, referred to as the "Oslo Resolution" is not binding on the Contracting Parties; however it does provide uniformity in the type of measures that each country is obliged to work towards. By adopting the Resolution, Canada also has an obligation to enact measures in accordance with the Resolution.

The Resolution states that the Contracting Parties shall:

- cooperate in order to minimize possible adverse effects on wild salmon stocks from aquaculture;

- take measures to minimize escapes, straying of ranched salmon, and adverse genetic and other biological interactions from enhancement;

- take measures to minimize the risk of transmission of diseases; and,

- develop practices, including research and development, which minimize effects on wild stocks and improve effectiveness of the measures contained in the Resolution.

The Annex to the Resolution lists measures that should be implemented. It emphasizes measures to prevent interactions of cultured and wild salmon through minimizing escapes and efficient recapturing of escaped fish.

iii) Precautionary Approach

NASCO and its Contracting Parties agreed, at its annual meeting in 1998, to adopt and apply a "Precautionary Approach" to the conservation, management and exploitation of salmon in order to protect the resource and preserve the environment in which it lives (Anon 1998). Accordingly NASCO and its Contracting Parties should be more cautious when scientific information is uncertain, unreliable, or inadequate. The absence of adequate scientific information should not be a reason for postponing or failing to take conservation and management measures. The "Precautionary" Approach adopted by NASCO is consistent with the "Precautionary Approach" put forth in the UN *Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks* (see page 7-8).

The "Precautionary Approach" requires, *inter alia*:

- avoidance of changes that are not potentially reversible;
- identify and take measures to avoid undesirable outcomes;
- initiate corrective measures without delay;
- give priority to conserving the productive capacity of the resource where the likely impact of the resource is uncertain; and,
- appropriate placement of the burden of proof.

The "Precautionary Approach" will apply to the entire range of a country's salmon conservation and management activities. The initial application will be to: 1) management of North Atlantic salmon fisheries; 2) formulation of management advice and associated scientific research; and 3) introductions and transfers, including aquaculture impacts and possible use of transgenic salmon.

With respect to the latter as it applies to the North American Commission, the "Agreement on the Adoption of a Precautionary Approach" states that implementation of the measures contained in the NAC "Protocols on the Introduction and Transfers of Salmonids" is essential in light of the "Precautionary Approach".

Canada is not bound to conform to the "Precautionary Approach", however, since Canada agreed to adopt the Agreement, it is obligated to apply the "Precautionary" principles to the extent possible. This Agreement, like the "Oslo Resolution", provides some consistency among Contracting Parties in the application of management measures. NASCO is presently developing an action plan for application of a "Precautionary Approach".

International Council for the Exploration of the Sea (ICES)

i) Code of Practice on the Introductions and Transfers of Marine Organisms, 1994

The ICES "Code of Practice" provides a guide with recommended procedures and practices to diminish the risks of detrimental effects from the intentional introduction and transfer of marine (including brackish water) organisms. The Code is divided into five sections of recommendations relating to:

1) the steps to take prior to introducing a new species;

2) the steps to take after deciding to proceed with an introduction;

3) the prevention of unauthorized introductions;

4) policies for ongoing introductions or transfers which have been an established part of commercial practice; and

5) The steps to take prior to releasing genetically modified organisms.

The ICES Code permits broad and flexible application to a wide range of circumstances and requirements. ICES has published two extended Guides to the Code. The latest is entitled "Codes of Practice and Manual of Procedures for Consideration on Introductions and Transfers of Marine and Freshwater Organisms" (Anon 1988).

Member Countries of ICES are obligated to comply with the ICES Code. It was used in the development of the NAC "Protocols for the Introduction and Transfers of Salmonids".

United Nations

i) United Nations, Convention on the Law of Sea (UNCLOS)

Canada is a signatory to the UNCLOS (1982); but since ratification is pending, its terms are not binding. However, being a signatory, Canada should not take measures that would contravene the Convention. **Article 66 - Anadromous Stocks** has bearing on the interactions of aquaculture and wild salmonids. It reads as follows: "... states shall ensure their (stocks) conservation by the establishment of appropriate regulatory measures....".

ii) Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks

Canada is signatory to the *Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks* (1995). Since the Agreement is pending ratification, Canada should not take action to contravene it. This agreement advances the "Precautionary Approach", and states agree to use more caution when information is uncertain, unreliable or inadequate; the absence of scientific

information should not be used as a reason for postponing or failing to take conservation and management measures.

iii) Convention on Biological Diversity

Canada, with the support from the Provincial and Territorial governments, ratified the *United Nations Convention on Biological Diversity* in 1992. The Convention has three objectives: 1) the conservation of biological diversity; 2) the sustainable use of its components; and 3) the fair and equitable sharing of the benefits arising out of the utilization of genetic resources.

The Convention has 42 Articles, three of which are of particular relevance to governments' policies and strategies in dealing with interaction of aquaculture and wild salmon populations. These are: **Article 8 - In-situ Conservation** (ensuring the conservation and sustainable use of biological resources); **Article 10 - Sustainable Use of Components of Biological Diversity**; and, **Article 14 - Impact Assessment and Minimizing Adverse Impacts**.

As a Party to the Convention, Canada is bound by its terms, including the obligation to develop a "Canadian Biodiversity Strategy", which was published in 1995 (Anon 1995a). This Strategy influences DFO's policy and direction with respect to impacts of aquaculture on aquatic biodiversity. The Strategy provides an approach to ecological planning and management to conserve biodiversity and use biological resources in a sustainable manner. The strategy makes specific reference to:

- strengthen measures to reduce and eliminate the release of substance, or quantities of substances that are harmful to ecosystem, species and genetic resources;

- reduce to acceptable levels, or eliminate, adverse impacts of species introductions on aquatic biodiversity resulting from aquaculture projects, fisheries enhancement programs and inter-basin transfers of water and organisms; and,

- participate in international fisheries conservation efforts to develop and encourage the implementation of ecological management approaches, and to develop sustainable use agreements.

iv) Food and Agriculture Organization (FAO) - Code of Conduct for Responsible Fisheries

FAO formulated a global "Code of Conduct for Responsible Fisheries", which is intended to be consistent with previous conventions, UN laws, and agreements. It is non- mandatory, and establishes principles and standards applicable to the conservation, management and development of all fisheries (Anon.1995b). Although the Code is voluntary, certain parts are binding based on relevant rules of international law and agreements. The term fisheries, as used in the Code,

applies equally to capture fisheries and aquaculture. The Code was unanimously adopted in October 1995.

One of the General principles is that "States should consider aquaculture, including culture based fisheries, as a means to promote diversification of income and diet. In so doing, States should ensure that resources are used responsibly and the adverse impacts on the environment and on the local communities are minimized." (**Article 6.19**)

Article 9 of the Code specifically deals with aquaculture development and sets out principles and standards of behavior for responsible practices with a view to ensuring the effective conservation, management and development of aquaculture resources, with due respect for the ecosystem and biodiversity. The Code promotes sustainable development and steps to minimize adverse effects on environment and adverse genetic, disease and other effects of escaped farmed fish on wild stocks. The Code also promotes responsible aquaculture husbandry.

Subsequent to the Code, FAO produced a technical guide that provides general advice in support of the implementation of **Article 9 - Aquaculture Development** (Anon 1997a). The Technical Guidelines have no formal legal status.

L'Office International des Epizooties (OIE)

The OIE, formed in 1924, is the world Organization for animal health. The OIE set up a specialist commission, the Fish Diseases Commission, in 1960. The Fish Diseases Commission developed standardized aquatic animal health requirements for international trade in 1995. These requirements are provided in the "OIE International Aquatic Animal Health Code" (OIE Code) (Anon 1997b) and "OIE Manual of Standards for Diagnostic Tests and Vaccines" (Anon 1997c). The OIE standards for aquatic animal health are recognized by the World Trade Organization (WTO) as international standards. Consistency of national health protection regulations with the OIE Code minimizes the risk of a country being accused of having non-tariff trade barriers based on fish health concerns.

World Trade Organization (WTO)

The World Trade Organization administers the *General Agreement on Tariffs and Trade* (GATT 1994), which includes an agreement on the application of *Sanitary and Phytosanitary Measures* (SPS). The SPS outlines the standards by which countries can establish measures for protecting animal and plant resources, and human health. The primary objective of these standards is to ensure that measures are not used as disguised restrictions on trade. The WTO also has procedures and rules governing the settlement of trade disputes between countries, including disputes related to fish health issues.

North American Free Trade Agreement (NAFTA)

Signatories to NAFTA include Canada, USA and Mexico. As with GATT, the NAFTA includes a section on SPS, which gives the parties the right to develop measures to protect

human, animal or plant life and health. The SPS measures should be applied only to the extent necessary to protect resources, and should not be applied in a manner that would constitute a disguised restriction on trade.

Federal Legislation

Fisheries Act

The *Fisheries Act* is one of the strongest pieces of environmental legislation in Canada. The Department of Fisheries and Oceans administers the *Fisheries Act* except for *Section* 36, which is administered by the Department of the Environment. All aquaculture activities must conform by law to the *Fisheries Act*.

i) Section 4

Section 4 of the *Fisheries Act* enables the Minister of DFO to give permission to obtain fish for purposes of stocking or artificial breeding for scientific purposes. This section has been used to permit the importation to Canada or between provinces of salmonid eggs from sources that do not meet health certification requirements under the *Fish Health Protection Regulations*. Rigorous disease testing and holding of eggs in quarantine are required for approvals under *Section* 4. Requests to import are reviewed first by the Local Fish Health Officer in the receiving province, then by the DFO Assistant Deputy Minister, Science, and finally by the DFO Regional Director General for the receiving province.

ii) Sections 34 to 42

These *Sections* of the *Fisheries Act* contain provisions for habitat protection and pollution prevention. The provisions that constitute the core of fish habitat protection and pollution prevention are in *Sections* 35 and 36. *Section* 35 prohibits any work or undertaking that results in harmful alteration, disruption or destruction of fish habitat, unless the Minister authorizes it. *Section* 36 prohibits the deposition of deleterious substances of any type in waters frequented by fish unless authorized by regulation. This *Section* also provides the regulatory authority to designate substances "deleterious", and to set limits for their discharge.

iii) Fish Health Protection Regulations (FHPR)

The FHPR were promulgated under *Section* 43 of the *Fisheries Act*. They are designed to minimize the risk of importing infectious diseases of concern in shipments of live salmonid eggs and fish, and dead uneviscerated salmonids, into Canada or between provinces. All shipments into Canada and between provinces require an Import Permit issued by a Local Fish Health Officer in the receiving province. The decision whether to allow an importation or not is based on the source facility having a valid Fish Health Certificate issued by a Fish Health Official. Fish Health Certificates are only issued after a facility has a history of disease testing to determine what diseases/disease agents are present or absent. Guidelines for Local Fish Health Officers

provide that Import Permits can be issued only when the import of the eggs or fish will not result in the introduction of a disease agent of concern that is not already known to occur in a province. These Regulations are designed to provide protection to both wild and cultured fishes. The FHPR are currently under review.

iv) Fisheries (General) Regulations

The *Fisheries (General) Regulations* were also promulgated under *Section* 43 of the *Fisheries Act*. Part VIII requires that a licence be obtained to release live fish into fish habitat or to transfer live fish to a fish rearing facility. These licences may be issued if: (1) the activities would be in keeping with the proper management and control of fisheries; (2) the fish do not have any disease or disease agent that may be harmful to the protection and conservation of fish; and (3) the release or transfer will not have an adverse effect on the stock size of fish or the genetic characteristics of fish or fish stocks.

Introductions and Transfers Committees have been established in each of the Maritime Provinces. These committees are chaired by DFO and are comprised of representatives from various federal and provincial departments, including experts in fish biology, habitat management, and fish health. The committees advise on the potential risk of adverse effects that a proposed introduction or transfer may have on wild fish populations, on farmed fish and/or on fish habitat as well as advice on the consistency of the introduction and transfer with existing policies and regulations. These Committees review individual applications and more generic requests depending on the circumstances.

Health of Animals Act

The *Health of Animals Act*, administered by the Canadian Food Inspection Agency, has provisions related to the importation, production procedures, testing, and sale of biologics (e.g. vaccines and antisera for diagnostics).

Food and Drugs Act

The *Food and Drugs Act*, administered by Health Canada, requires approval of drugs (antimicrobials) to be used in aquaculture. Prescriptions for treatment of fish disease outbreaks can only be issued by veterinarians.

Pest Control Products Act

Pesticides must be registered for use in aquaculture under the *Pest Control Products Act*, administered by the Pesticide Management and Regulatory Agency. Pesticides are dealt with separately from drugs, pesticides being defined as chemicals applied topically to treat external pests (e.g. sea lice).

Navigable Waters Protection Act

The siting of some aquaculture sites may require approval under *Section* 5.1 of the *Navigable Waters Protection Act* (*NWPA*). The *NWPA* was developed to provide safe passage for watercraft. Thus the terms and conditions of approval should minimize the risk of a watercraft colliding with a rearing cage, and possible subsequent escapement of fish.

Oceans Act

The *Oceans Act* came into effect in January 1997. It consolidates existing legislation related to the oceans into one single *Act*, which promotes a new and integrated approach to managing the oceans. The *Act* provides, through an integrated management approach, the authority to define areas of the oceans, including estuaries, for special protection. Aquaculture may or may not be affected by these Marine Protected Areas.

Provincial Laws and Regulations

Aquaculture Acts/Regulations

New Brunswick (NB) and Nova Scotia (NS) have provincial Acts which control aquaculture development, those being the *Aquaculture Act* (NB), proclaimed in 1991, and the *Fisheries and Coastal Resources Act* (NS), as assented in 1996. Prince Edward Island (PEI) does not have an Aquaculture Act. The authority to administer aquaculture licencing in PEI remains with DFO: however, the PEI Department of Fisheries and Tourism, Fisheries and Aquaculture Division, deals with the biological and technical development of the industry.

The Nova Scotia *Aquaculture Act* gives authority to the Minister to issue aquaculture licences and leases and to establish conditions of these licences and leases. Nova Scotia enacted *Aquaculture Regulations* of 1991 under authority of the *Aquaculture Act*, which was in existence at that time. These *Regulations* stipulate that no person shall transfer any salmonid (eggs, fry, fingerling or adult) for aquaculture purposes without a permit from the Minister. The *Regulations* are in the process of being amended, one draft was circulated for comments earlier in 1998.

The New Brunswick *Aquaculture Act* stipulates in *Section* 11(1) that upon issuing, renewing or amending an aquaculture license, the Registrar may, in addition to any terms and conditions established by or in accordance with the regulations, make the license subject to terms and conditions in relation to: (a) adherence to an aquaculture site development plan approved by the Registrar; (b) standards relating to site utilization, stocking densities and production at aquaculture sites; (c) measures to be taken to minimize the risk of environmental degradation; (d) measures to be taken to prevent the escape of aquaculture produce; (e) measures to be taken to minimize the risk of disease, parasites, toxins or contaminants spreading to other aquaculture sites; (f) measures to be taken to ensure the maintenance of applicable health, grade and genetic standards; and (g) any other matter the Registrar considers necessary for the purpose of this *Act*

and the regulations. The Minister also has established the Aquaculture Site Evaluation Committee, as described in the *Aquaculture Act, Section* 37 (1) and 37 (2), who advises the Minister on the issuance and amendments to aquaculture licenses and leases, in relation to site selection criteria for aquaculture land. This committee assesses input from both provincial and federal departments, namely: DFO, Environment Canada, NB Department of Natural Resources and Energy, and NB Department of Environment.

New Brunswick has promulgated regulations specific to aquaculture, called the *General Regulation-Aquaculture Act*. These regulations deal with the issuance of aquaculture licences and leases as well as the conditions that may be imposed on these licences and leases. The *General Regulations – Aquaculture Act*, have very specific sections that prohibit, unless written permission is received from the Minister, the movement of live finfish from inland aquaculture sites to a marine environment, or a marine aquaculture site to another aquaculture site, or from one aquaculture site to another, without specific fish health testing and requirements being met.

In 1995, an annual environmental monitoring program, along with a rating system for the Bay of Fundy finfish aquaculture industry, was developed and implemented. Sites are rated, A, B, or C, according to sedimentary and environmental conditions under and near the site. An "Environmental Remediation Guide", has been developed which identifies the schedule of actions farmers will be requested to take if they have sites identified as impacted (a 'C' rating). These actions will mitigate the impact to the seafloor and surrounding environment and ultimately the health of the site and industry. The sites specific plan of action will be developed between the farmers and the Site Remediation Committee and approved by the Minister of Fisheries and Aquaculture.

The NB Department of Fisheries and Aquaculture is planning the implementation of a Site Allocation Policy for the Bay of Fundy for the further allocation and issuing of marine leases. The new policy will cover many aspects of aquaculture development from environmental assessments of sites, Bay Management Area agreements, and site fallowing and year-class separation.

A NB "Fish Health Policy" for salmon aquaculture is being developed in consultation with industry and government and is planning for implementation in 1999. The policy objectives are: to limit the risk of economic loss from disease, to optimize production and sustainability of the industry while protecting the public' s interest, to provide an operational framework for implementation and, to ensure that fish health practices are undertaken in an environmentally acceptable manner.

Acts Related to Water Quality

New Brunswick has a *Clean Water Act*, which is administered by the Department of the Environment. It requires that freshwater hatcheries be screened for environmental impact registration as a means to protect the environment and, hence, habitat of living animals, plants, etc. Nova Scotia has an *Environment Act* (1995), which includes designation regulations. It includes conditions relevant to water withdrawal, effluent control etc. PEI has an *Environmental*

Protection Act, which states that no person shall contaminate or discharge harmful substances into waters of PEI, thereby helping to ensure the quality of water including water from aquaculture operations.

Federal and Provincial Policies and Agreements

DFO Policy for the Management of Fish Habitat

DFO published a "Policy for the Management of Fish habitat" in 1986, which applies to marine coastal areas, as well as in freshwater and estuaries (Anon 1986). The objective of the Policy is to increase the natural productive capacity of habitats for the nation's fisheries resources, which includes aquaculture. There are three goals: fish habitat conservation, restoration, and development. The Policy provides an implementation strategy, which includes, among other things, integrated resource planning and enforcement and compliance.

Wildlife Policy for Canada

The "Wildlife Policy for Canada" is a national policy, adopted in 1990, which provides a framework for federal, provincial, territorial and non-governmental policies and programs that affect wildlife, including fish (Anon 1990). The goal of the Policy is to maintain and enhance the health and diversity of Canada's wildlife, for its own sake and for the benefits of present and future generations. DFO is obligated to take this Policy into consideration when developing its fisheries policy and regulations.

Federal Aquaculture Development Strategy

DFO released an "Aquaculture Development Strategy" in 1995 (Anon. 1995c). The objectives of the Strategy are to create an economic and regulatory environment that allows aquaculture to prosper, and to continue to ensure the environmental integrity where aquaculture is practiced. The Strategy identifies aquaculture development as a priority of the federal government; and, government policy and regulatory framework must not unduly constrain development. However, the Strategy also states that aquaculture development must be consistent with government responsibilities in such areas as habitat and biodiversity. DFO's dual role is clearly identified. Section 6.5 deals with "Environmental Sustainability and Interaction". It states that " Care must be taken to ensure the integrity of all aspects of the aquatic environment, including seafloor and substrate, biodiversity, habitat and disease transfer. ... The federal government will... develop and implement a responsive and effective regulatory and policy framework to ensure that aquaculture is conducted in an environmentally sustainable manner." The Strategy also states that aquaculture must be afforded equitable access, among commercial, recreational, aboriginal and municipal users, to seedstock and to coastal and inland aquatic resources.

Memoranda of Understanding (MOU)

Prince Edward Island and DFO signed an "Agreement for Commercial Aquaculture Development" in 1987. As a result of this Agreement, the control of aquaculture development rests primarily with DFO. DFO issues the aquaculture leases, licences, transfer licences, and essentially all aspects of fish farming. The Province deals with such issues as watercourse alteration, well drilling permits, and the enforcement of effluent guidelines.

DFO has also signed **Memoranda of Understanding for Aquaculture Development** with the Department of Fisheries and Aquaculture in New Brunswick and Department of Fisheries and Aquaculture in Nova Scotia. These provincial departments are the lead agencies in the development of aquaculture. The MOUs define the respective agency's role in the development of aquaculture. The MOUs give the authority to the provinces for leasing and licensing; however, proposals for aquaculture licences and leases will be forwarded to DFO for comments. The provinces have the responsibility for administration of the licences and leases. DFO maintains responsibility for its enactments, but there is shared responsibility for compliance monitoring and research and development.

Provincial Rainbow Trout Policies

New Brunswick and Nova Scotia have well defined policies dealing with the introduction of rainbow trout. These policies take into consideration concerns regarding the implications for native stocks, recreational fisheries management practices, and the requirements of the aquaculture industry. Both provinces have a zoning system; the New Brunswick policy is consistent with the DFO policy as outlined in the NAC Protocols with some additional provisions. Sterile rainbow trout are required in most Rainbow Trout Districts except in totally closed systems and closed farm or fish-out ponds. However, the policy allows for a five-year phase in period that will allow persons currently cultivating rainbow trout to come into compliance with this new policy. The phase in period was extended one year to March 31, 1999. Nova Scotia's Policy permits the use of rainbow trout in aquaculture in all Rainbow Trout Districts, although uses in some districts would be given selective approval, and proposals would be forwarded to DFO's Introductions and Transfers Committee prior to moving the fish to a new location. PEI has a Rainbow Trout Policy that indicates where fish may be held in sea cages; however presently, there are no sea cage cultures of this species on the Island.

Provincial Wildlife Policies

The New Brunswick Department of Natural Resources and Energy published "A Wildlife Policy for New Brunswick" in 1995. It provides guidance on decisions that affect wildlife and its use including fish, plants, animals, and bacteria. The Policy's primary intent is to protect wildlife for present and future generations but at the same time permit activities such as aquaculture so long as it is done in such a way so as to minimize the risks of adverse effects on native wildlife.

The PEI Department of the Environment developed "A Wildlife Policy for Prince Edward Island" (1995) with the objectives of protecting and enhancing the Island's natural environment,

etc. It states, under the category of "Aquaculture", that "Specified native and exotic fish and other aquatic species may be kept in captivity for commercial production or for later introduction to the wild under a combination of federal and/or provincial permits that ensure the management needs and concerns described above are met". This Policy was followed in September 1998, by the *Wildlife Conservation Act* that reinforces the Policy and gives legal authority for actions to be taken, when violations of the *Act* occur.

In Nova Scotia there is also a "Wildlife Policy"(1998) that has very similar goals as the wildlife policies of the other two Maritime Provinces; however, no specific mention is made of aquaculture. The broader principles include the ethics of conservation and sustainable use of wildlife populations, habitats, and ecosystems in Nova Scotia.

Discussion

There are a number of international conventions, agreements, and obligations as well as federal and provincial legislation, agreements, and policies that pertain to controlling and minimizing potential negative effects of aquaculture on wild salmon stocks. These negative effects could be in the form of changes in genetic fitness of populations, fish health, or ecological effects. The international agreements and codes tend to fall into one of two categories: those that were developed for the primary intent of promoting or ensuring conservation and sustainability of fisheries resources; and, those that were developed to provide consistent international standards for fish health and quality of fish for international trade. International agreements also provide a mechanism for protecting a country's aquatic resources from adverse effects of activities that are occurring or proposed to occur in another country.

These international agreements also benefit the aquaculture industry by providing consistent standards for conducting business so that one country does not have a competitive advantage over the other in some aspects of the aquaculture operations, including trade barriers. Although many of the international agreements that are signed or adopted by Canada are not legally binding, Canada is obligated to uphold commitments made under these agreements. These commitments influence the way DFO makes decisions about fisheries management and aquaculture. The NAC Protocols for the Introduction and Transfers of Salmonids forms the basis for DFO's policy on introductions and transfers in eastern Canada at the present time.

There are federal-provincial agreements on the development of aquaculture that define the responsibilities of the two levels of government. DFO has a mandate for conservation and protection of the wild salmon stocks as well as promoting aquaculture development. New Brunswick and Nova Scotia governments have the authority for leasing and licencing aquaculture, and place controls on husbandry practices including restrictions on movements of fish. The movement of live salmonids requires an Import Permit to traverse provincial boundaries and a transfer licence for all movements; both are issued by DFO. It is through a review of applications for movement of fishes that DFO can determine if the proposed introduction or transfer has a risk of adverse effects on wild fish populations or cultured fish. The review also provides the opportunity to determine if proposed fish movements would comply

with existing regulations or policies. The permit/licence requirement is an important and essential mechanism that provides an opportunity to impose measures to minimize the impacts of introductions and transfers on wild and cultured salmonids. However, there are instances in which some government agencies and industry do not comply with this requirement, which poses a risk of adverse impacts on wild stocks and may render farm fish vulnerable.

The *Fish Health Protection Regulations* are important for protecting both wild and aquaculture salmonids from certain diseases. New Brunswick imposes additional constraints on the movement of salmonids to reduce the risk of spreading specific fish diseases.

DFO must consider its mandated responsibilities for conservation and protection of the aquatic resources, as required under federal legislation, when establishing controls on the aquaculture industry. DFO is required to give aquaculture the same consideration with respect to access to aquatic resources as afforded other resources users. DFO must also consider provincial legislation and policies, and international commitments. Most of the international commitments contain good stewardship practices for conserving the natural resources. These agreements not only emphasize the federal government's commitment to protect fish and fish habitat, but also establish a level and consistent operating regime and standards for the aquaculture industry, including trade.

The "Precautionary Approach" for managing fisheries is gaining acceptance, both nationally and internationally as governments recognize that past practices have not been sufficient to protect the aquatic resources. Implementation of the "Precautionary Approach" will put additional constraints on the aquaculture industry if the impacts of certain activities are uncertain.

Federal and provincial legislation and policies are frequently revised as conservation requirements and the needs of resource users and aquaculture change. DFO is currently considering legislation concerning endangered species, which could have an impact on the aquaculture industry. A "National Policy on Introductions and Transfers" is in its final draft stages; and, it is expected to be implemented in the near future.

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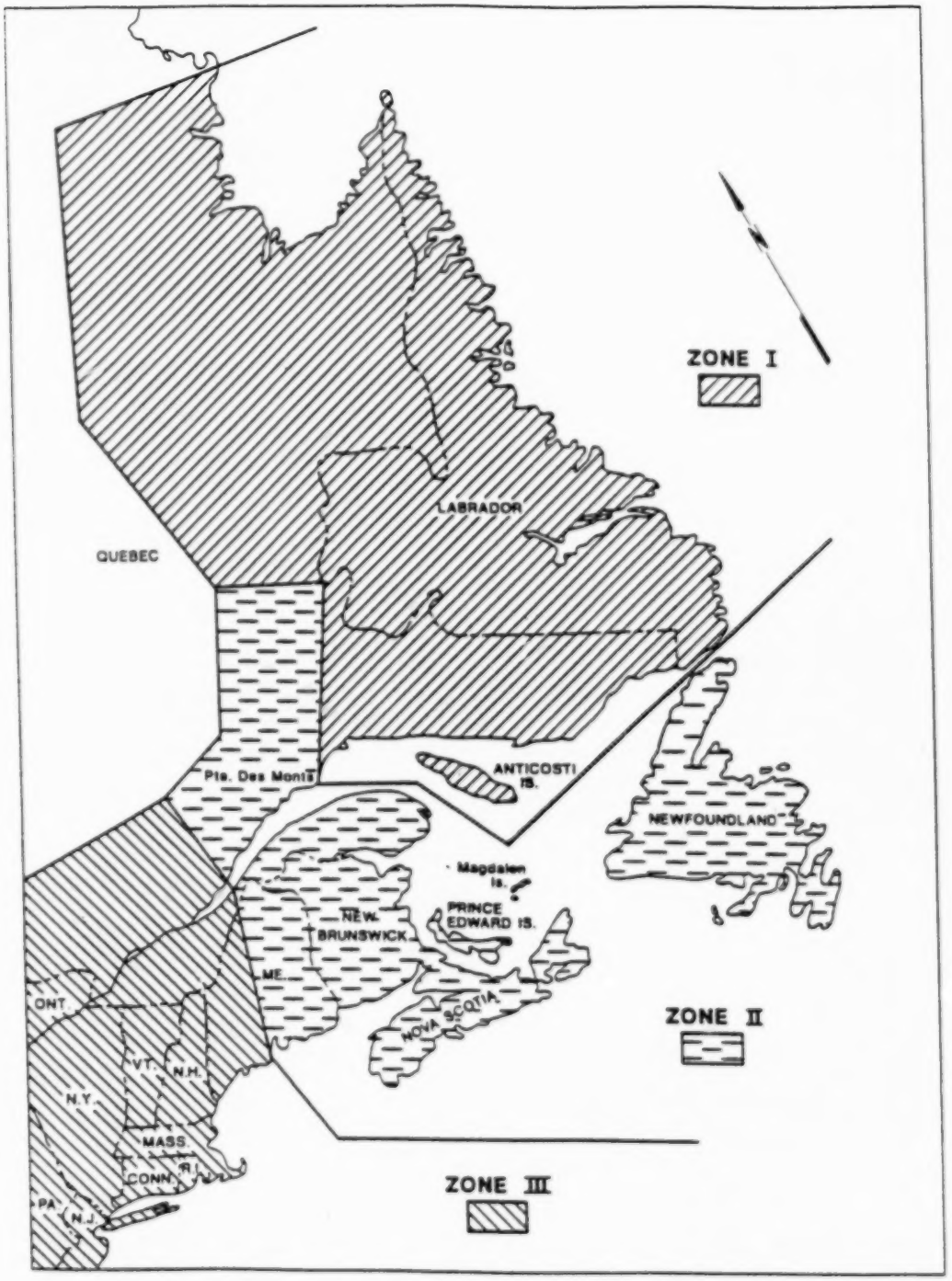

Fig. 1 Map of eastern Canada and northeastern USA showing the three zones designated for implementation of the Protocols (see also Section 2).